

Attorney Docket No.: LM P120US

11/092,390

**Currently Pending Claims****What is Claimed:**

1. (Original) A method to generate and detect ultrasonic surface displacements at a remote target comprising:
  - calibrating optical sensors;
  - generating ultrasonic displacements at a surface of the remote target;
  - generating a detection laser beam;
  - directing the detection laser beam to the surface of the remote target;
  - scattering the detection laser beam with the ultrasonic surface displacements at the surface to produce phase modulated light;
  - collecting the phase modulated light;
  - collecting information from the optical sensors;
  - processing the phase modulated light to obtain data representative of the ultrasonic surface displacements at the surface; and
  - collecting the data with the information to analyze structures within the remote target.
2. (Original) The method of Claim 1, wherein calibrating the optical sensors comprises directing the optical sensors at least one multi-mode target.
3. (Original) The method of Claim 2, wherein the at least one multi-mode target is an array of targets.
4. (Original) The method of Claim 2, wherein the optical sensors further comprise at least one sensor selected from the group consisting of depth cameras, optical cameras, and narrow band cameras.
5. (Original) The method of Claim 2, wherein the multimode target comprises contrasting optical fields, depth discontinuities and/or laser diodes.

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6. (Withdrawn) A multi-mode calibration target operable to calibrate multiple optical sensors, comprising:

a first planar surface, having a first color; and

a second planar surface having a second color that contrasts with the first color, wherein:

the second planar surface is parallel to the first planar surface; and

the second planar surface is raised or recessed from the first planar surface.

7. (Withdrawn) The multi-mode calibration of Claim 6, further comprising at least one laser diode located at a predetermined location in the multi-mode calibration target.

8. (Withdrawn) The multi-mode calibration target of Claim 6, wherein the first planar surface is fabricated of the material to be tested.

9. (Withdrawn) The multi-mode calibration target of Claim 8, wherein the material comprises composite materials.

10. (Withdrawn) The multi-mode calibration of Claim 6, wherein the second planar surface is a regular polygon.

11. (Withdrawn) The multi-mode calibration of Claim 7, wherein the multiple optical sensors comprise depth cameras, optical cameras, and/or narrow band cameras of a laser ultrasonic inspection system.

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12. (Original) A laser ultrasonic inspection system operable to detect ultrasonic displacements at a remote target, comprising:

a plurality of optical sensors, wherein the optical sensors are calibrated with a multi-mode calibration target and wherein the optical sensors gather information at the remote target;

a detection laser source to generate a detection laser beam;

a first optical assembly that receives and directs the detection laser beam to the remote target where ultrasonic displacements at the remote target scatter the detection laser beam to produce phase modulated light;

collection optics to collect the phase modulated light;

an interferometer to process the phase modulated light and generate at least one output signal; and

a processor operable to process:

the at least one output signal to obtain data representative of the ultrasonic displacements at the remote target;

process information gathered by the plurality of optical sensors; and

correlate data representative of the ultrasonic displacements at the remote target and information gathered by the plurality of optical sensors.

13. (Original) The laser ultrasonic inspection system of Claim 12, wherein the multi-mode calibration target comprises:

a first planar surface, having a first color; and

a second planar surface having a second color that contrasts with the first color, wherein:

the second planar surface is parallel to the first planar surface; and

the second planar surface is raised or recessed from the first planar surface.

14. (Original) The laser ultrasonic inspection system of Claim 12, further comprising a laser diode located at a predetermined location in the multi-mode calibration target.

15. (Original) The laser ultrasonic inspection system of Claim 12, wherein the first planar surface is fabricated of the material to be tested.

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16. (Original) The laser ultrasonic inspection system of Claim 15, wherein the material comprises composite materials.

17. (Original) The laser ultrasonic inspection system of Claim 12, wherein the second planar surface is a regular polygon.

18. (Original) The laser ultrasonic inspection system of Claim 13, wherein the multiple optical sensors comprise depth cameras, optical cameras, and/or narrow band cameras of a laser ultrasonic inspection system.

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19. (Withdrawn) A method of calibrating multiple optical sensors of an optical inspection system, comprising:

arranging a multi-mode target at predetermined locations within a work area;  
directing the multiple optical sensors at the multi-mode target;  
gathering optical data from the multiple optical sensors;  
comprising the optical data to known data associated with the multi-mode target; and  
correlating the optical data from the multiple optical sensors based on the known data.

20. (Withdrawn) The method of Claim 19, wherein the multi-mode target comprises:

a first planar surface, having a first color; and  
a second planar surface having a second color that contrasts with the first color, wherein:  
the second planar surface is parallel to the first planar surface; and  
the second planar surface is raised or recessed from the first planar surface.

21. (Withdrawn) The method of Claim 20, wherein the multi-mode target further comprises a laser diode located at a predetermined location in the multi-mode calibration target.

22. (Withdrawn) The method target of Claim 20, wherein the multi-mode target is fabricated of the material to be tested.

23. (Withdrawn) The method target of Claim 22, wherein the material comprises composite materials.

24. (Withdrawn) The method of Claim 20, wherein the second planar surface is a regular polygon.

25. (Withdrawn) The method of Claim 21, wherein the multiple optical sensors comprise depth cameras, optical cameras, and/or narrow band cameras of a laser ultrasonic inspection system.